

Pacing troubleshooting

A decorative horizontal bar spanning the width of the slide. It features a yellow-to-orange gradient background with a pattern of small dots. Overlaid on this are images of autumn leaves in shades of green, yellow, and brown on the left, and a blue and white rock formation on the right. A vertical orange bar is positioned on the far left, partially behind the text.

NASPE training

Lancashire & South Cumbria Cardiac
Network



Pacing stimulus present – failure to capture

- Lead dislodgement
 - Early – unstable position
 - Late – twiddlers syndrome

- Abnormal ECG
- Abnormal X-ray
- Normal impedance
- Elevated threshold

- Reposition lead



Lead dislodgement –extra notes

- Change in pacing morphology/chamber if capture is seen
- Ensure current of injury is seen – correlation poor injury pattern to lead dislodgement
- Check suture sleeve site at re-op
- Thrombus may have developed around tip, encasing tines/helix and preventing adequate fixation at reposition
- Twiddlers syndrome – replace rather than reposition (sub pectoral placement)



Pacing stimulus present – failure to capture

- Lead maturation
 - Early – inflammatory response
 - Late – progressive fibrosis
- Normal ECG, X-ray, impedance
- Elevated threshold
- Increase output, trial steroids, reposition/replace lead



Lead maturation –extra notes

- Inflammatory reaction causes lead to displace slightly from myocardium
- If excessive – failure to capture, termed exit block – higher chance if high thresholds seen at implant, incidence <5%
- Incidence lower, steroid eluting leads
- Temp wire – until threshold falls if pacemaker dependant
- Systematic steroids (effective 50% patients high thresholds post implant) 60mg prednisone/day – adults and 1mg/kg – pediatrics
- Check 5days later, if no change = ineffective and if lower continue steroids for 1 month



Pacing stimulus present – failure to capture

- Late high thresholds
 - Progressive fibrosis, MI, Cardiomyopathy, Drugs/metabolic changes, Damaged lead
- Normal ECG, X-ray, impedance
- Elevated threshold
- Increase output, correct cause, replace lead



Lead maturation – extra notes

- Chronic lead – will not respond to steroids
- Hyperkaleamia, acidemia
- Drugs
- Progressive fibrosis/MI/Myopathy – new lead
- Caution – lead problem seen intermittently on telemetry, telemetry error



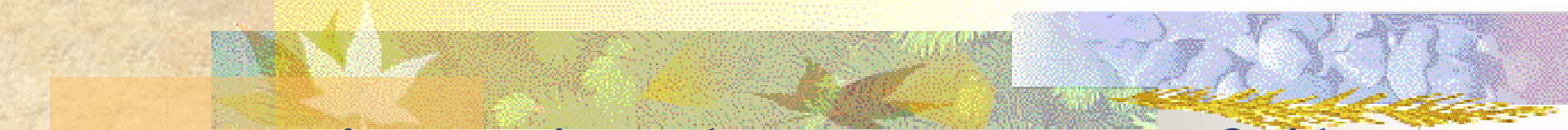
Pacing stimulus present – failure to capture

- Insulation failure
 - Suture sleeve, clavicular crush (medial subclavicular musculotendinous complex!!)
- Normal ECG, X-ray (possible to see conductor deformity)
- Decreased impedance
- Elevated threshold (due to shunting of stimulus away from myocardium)
- Reprogram to unipolar, replace lead



Insulation failure – extra notes

- Depends on location
- Unipolar or proximal portion bipolar – extracardiac pectoral stimulation
 - Insulation failure
 - Up side down pacemaker
 - Failure of Insulation on pacemaker
- Change pacemaker stimulus amplitude (analog ECG recorder)
 - Smaller pulse – shorter path between conductor & pacemaker – unipolar, failure inner insulation - bipolar
 - Larger stimulus – unipolarised signal of bipolar lead (outer insulation failure)



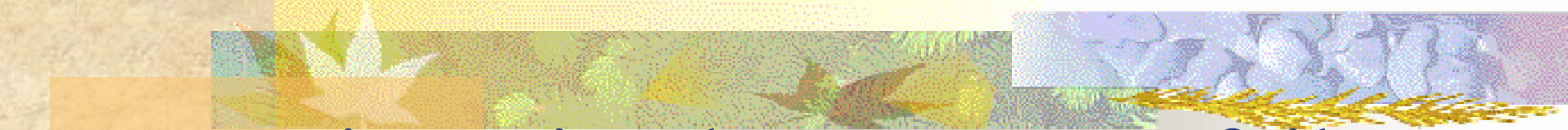
Pacing stimulus present – failure to capture

- Open circuit
 - Conductor fracture
 - Failure to tighten set screw
- ECG Normal
- X-Ray abnormal
- Impedance increased
- Threshold elevated
- Reprogram – unipolar, replace lead tighten screw



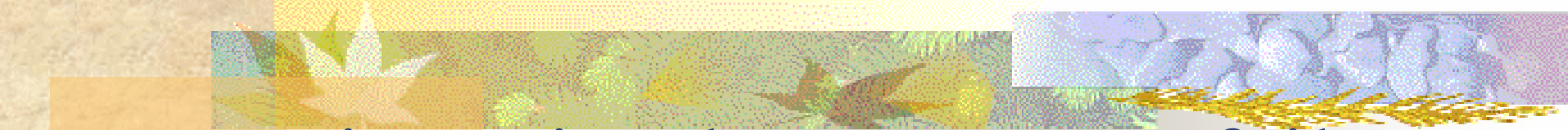
Open circuit – extra notes

- Total open circuit – no stimulus
- Incomplete circuit (2 ends meet) – stimulus with no capture (due to increased impedance)
- Or = air trapped in pocket of unipolar system where a previously large pacemaker has been replaced with small size device
- Partially open circuit – oversensing – noise created by make-break contact
- Easy to see in unipolar, difficult in co-axial bipolar as the intact conductor may mask the fracture



Pacing stimulus present – failure to capture

- Battery depletion
- Functional non-capture
 - Pseudofusion
- ECG, X-Ray, Impedances normal
- Threshold – elevated
- Replace pacer (depletion)
- Reprogram rate, refractory, sensitivity



Pacing stimulus present – failure to sense

- Lead dislodgement
 - Early – unstable position
 - Late – twiddlers syndrome
- Low amplitude EGM
 - Small P/R waves at implant
 - Different activation pattern (AF, PAC, BBB, PVC etc)
 - Medication change
 - Electrolytes
 - MI/Cardiomyopathy
 - Tissue fibrosis, lead maturation



Pacing stimulus present – failure to sense

- Insulation failure
- Functional undersensing
 - Magnet
 - Noise reversion mode
 - ERI
 - PMT
 - Mode switch
 - Upper rate behaviour
- Inappropriate programming



Pacing stimulus absent

- Oversensing
 - Cardiac signal
 - Myopotential/diaphragm
 - Pacing afterpotential
 - EMI
 - Cross talk
 - Make-break signals



Pacing stimulus absent

- Open circuit
 - Conductor break
 - Loose set screw
 - Air in pocket
 - Lead/pacemaker connector mismatch



Pacing stimulus absent

- Internal insulation failure
- Component malfunction/EOL – magnet application reveals no output
- Pseudo malfunction
 - Hysteresis
 - Rate smoothing
 - Mode switch
 - PMT
 - AV search hysteresis